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**METHOD AND DEVICE FOR HANDLING ERRORS IN A PRINTER OR COPIER**

The invention concerns a method and a device for error handling in a printer or  
5 copier. Occurring error states are transferred to a controller.

In modularly designed printer and copier systems, a plurality of modules are often affected by occurring errors. Each of these modules then generates an error message independent of the other modules and transmits this to a central controller  
10 of the printer or copier system. If the printer or copier system is connected with a central host system, for example a print spooler, these error messages are output both to the host system and to the printer or copier system itself, for example to a display unit of the printer or copier system. Multiple messages are thereby output to the host system and to a control panel or a control console of the printer or  
15 copier system that hamper the detection of the causative error, for example for an operating personnel, due to the multitude and uncleanness of the of the error messages. The host system can, for example, also react to a plurality of these error messages, whereby further problems can be created such as, for example, a multiple continuation of the interrupted printer or copier job, whereby print images  
20 still to be printed are doubly generated. An error protocol that is typically maintained in the printer or copier system, for example as a log file, also generally contains all of these error messages, whereby the evaluation of this log file after a recording over a longer period of time is nearly impossible. The multitude of these error messages also hampers a reaction to the automatic error correction by the  
25 printer or copier system.

In known printer or copier systems, messages of occurring errors have been output directly via a control console and have simultaneously been transferred to a host system. The evaluation of the errors has generally been ceded to the operating  
30 personnel.

The individual modules transmit error messages in the temporal sequence of the detection. It is thus difficult for an operating personnel to decide which errors are causative and which are consecutive faults. Thus, for example, a paper jam of a single page in the printer or copier system is first detected when, for example,

5       single page does not reach a light barrier. Depending on the light barrier separation and paper speed, to some extent a plurality of seconds pass until the detection of the error. Consequent errors, for example in the region of the printing group, sometimes occur before the light barrier notices the paper jam. The consequent error in the region of the printing group is thereby reported before the

10      error of the paper jam.

If an error message is transmitted to the host system, an intervention of the operating personnel is necessary both at the host system and at the printer or copier system in order to continue the printer or copier process. This is also necessary

15      when the error state no longer exists or the printer or copier system has itself remedied the error state and only a confirmation handling of the operating personnel is necessary at the host system and at the printer or copier system.

From the patent document US 6,185,379 B1 by the applicant, a method is known

20      for operation of a high-capacity printer with support given error states. The error states detected by monitoring units are divided into at least two error classes. The access to special information, at least given error states of the second error class, ensues via an access authorization procedure. Support is given both to the operating personnel in the correction of simple errors and to qualified technicians

25      in the correction of major or, respectively, complicated error causes to be remedied. The content of US 6,185,379 B1 is herewith incorporated by reference into the present specification. However, a support upon determination of the error cause when a plurality of monitoring units determine successive error states is not known from US 6,185,379 B1.

A method and a device to correct errors in an electronic reprography system are known from the document DE 691 25 677 T2. At least one error is detected during the normal operating module. This error is subsequently grouped into at least one error group, whereby a set of particular correction and reproduction instructions is  
5 associated with the error group.

A method for error handling in a printer or copier is known from the document US 6,185,379 B1. Given an occurred error, it is checked whether this is to be immediately remedied by an operating personnel or whether a specialized  
10 technician is necessary for correction.

It is the object of the invention to specify a method and a device for error handling in a printer or copier in which a simple error handling in a printer or copier is possible and necessary interventions of the operating personnel are reduced.  
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This object is achieved for a method for error handling in a printer or copier with the features of the patent claim 1. Advantageous developments are specified in the dependent patent claims.

20 Occurring error states are transmitted to a controller. A plurality of error states transmitted in succession are stored in a storage. The stored error states are evaluated by the controller, whereby the controller compares the stored error states with predetermined error patterns. The controller thereby determined at least one error type. Further steps are executed by the controller dependent on the error  
25 type.

It is thereby achieved that the occurred error states can be evaluated and only error messages relevant for the causative error are output, dependent on the determined error type. An operating personnel thereby no longer has to determine the  
30 causative error from a plurality of displayed error messages. Via the determination of at least the error type, the controller can automatically initiate further steps such

as, for example, the transmission of an error message to a superordinate host system or the automatic continuation of the printing process after automatic correction of the error cause. In particular with the aid of preset error patterns, an exact evaluation of the error cause by the controller can ensue. Error causes via

- 5 which error states occur, for example in a plurality of modules of the printer or copier, can thereby be determined simply. The occurred error states are communicated to the controller that simply determines from them (as already described) the error type, preferably the error cause.

- 10 According to a second aspect of the invention, a device for error correction in a printer or copier is specified. This device has a controller. Error states occurring in the printer or copier are transmitted to the controller. Furthermore, the device has a storage in which a plurality of error states transmitted in succession can be stored. The controller compares the stored error states with predetermined error  
15 patterns and determined at least one error type. The controller implements further measures dependent on the error type.

It is thereby achieved that the error cause is determined simply and quickly, in particular via the comparison with the error patterns, without interventions of an  
20 operating personnel being necessary. Only an error message on a display unit that informs the operating personnel about the error cause is output to the operating personnel. In contrast to the prior art, the operating personnel must thus no longer himself laboriously determine the relevant error message about the error type from a plurality of error messages that have been transmitted due to error states in  
25 connection with the original error. Via an evaluation of the error states with the aid of the controller, it can furthermore be achieved that the printing process is automatically restarted or an error message is transmitted to a superordinate controller such as, for example, a host system. Via the output of the error type, the operating personnel is precisely informed about the error cause, whereby the  
30 operating personnel can specifically correct the error cause when [sic] an automatic restarting of the printer or copier via automatic correction of an error and via

automatic continuation of the print job interrupted by the error. This continuation is designated as a restarting or resetting of the print job.

For better understanding of the present invention, in the following reference is  
5 made to the preferred exemplary embodiment shown in the drawings, which is described using specific terminology. However, it is to be noted that the protective scope of the invention should not thereby be limited since such changes and further modifications to the shown device and the method as well as such further applications of the invention as they are shown therein are viewed as typical  
10 present or future expertise of a competent average man skilled in the art.

Figures show an exemplary embodiment of the invention, namely:

Figure 1 a block diagram of a system for error correction in a printer or  
15 copier; and

Figure 2 the time sequence of error messages arriving after an error.

A block diagram of a system 10 for error handling in a printer 12 is shown in  
20 Figure 1. The printer 12 contains a controller 14 that, for example, is connected with a host computer 16 via a local network 18 (LAN-Local Area Network). The host computer 16 transfers print data to the controller 14 of the printer 12. The controller 14 transfers status messages and error messages to the host computer 16. The host computer 16 prepares print jobs and controls the sequence of the print  
25 jobs to be executed. The host computer 16 also controls a continuation of a print job after an error from a start point to be determined within the print job, after the printer 12 transmits the page number of the last page printed without error to the host computer. Alternatively, the amount of the data quantity correctly processed from the current print job up to the occurrence of the error can be transmitted to the  
30 host computer 16. A compensation of the execution status thus generally occurs between the controller 14 of the printer 12 and the host computer 16. The host

computer 16 then again transmits the print data for printing of the still unprinted pages to the printer 12.

The controller 14 prepares the print data transmitted by the host computer 16 and  
5 generates from these print data, for example, raster images of the print images to be printed. The printer 12 furthermore comprises a coordination module CM, a paper flow controller PT (paper trace) and an image recording unit PU (picture unit).

- 10 The coordination module CM registers individual pages to be printed in the paper flow controller PT and also coordinates the progression of the transport of the individual pages in the printer 12 with the image recording on the individual page between the paper flow controller PT, the image recording unit PU and the controller 14. The paper flow controller 14 and the image recording unit PU
- 15 transmit error messages to the communication [sic] module CM. The coordination module CM collects the transmitted error messages and implements an evaluation of these error messages. Furthermore, further monitoring units (not shown) transmit error messages given occurring errors. The monitoring units are contained in a plurality of device components (not shown) such as, for example, a
- 20 paper input unit, a paper output unit, a stack unit etc. The signal and data exchange between the individual controller modules 14, CM and the individual device units PT, PU of the printer 12 preferably ensues with the aid of a bus system.

- 25 The paper flow controller PT controls the transport of the individual pages through the printer 12 and generates messages to the coordination module CM about the correct depositing of the individual pages in a depositing tray or a stack unit. Furthermore, given an occurring paper flow error the paper flow controller PT generates one or more detailed error messages that are transmitted to the coordination module CM. The image recording unit PU is connected via the bus
- 30 system with the controller 14, whereby the image recording unit PU requests pixel data from the controller 14, whereupon the controller 14 transfers these pixel data

to the image recording unit PU for the generation of the print image. The image recording unit PU also generates a print image from these pixel data and transfers this on the side of a single page to be printed.

- 5     The coordinate module CM transfers position information of the individual pages to be printed to the image recording unit PU. The coordinate module CM registers individual pages to be printed in the image recording unit PU. In addition to error states of the printing unit, the image recording unit PU furthermore determines association errors that occur when the print image to be generated from the
- 10    currently present pixel diagnosis and/or therapy should be generated on a different page than that supplied to the printing unit. The image recording unit PU transfers page information of the individual page to be printed or, respectively, the printed individual page to the coordinate module CM as well as occurring error messages. The coordinate module CM furthermore transfers to the image recording unit PU
- 15    position information of the individual page to be printed that the coordination module CM has previously obtained from the paper flow controller PT.

The controller 14 furthermore comprises counters such as individual page counters, operating hour counters as well as page- and time-independent wear counters. An error storage, in which error statistics and operation states are stored and protocollled in the temporal sequence of their occurrence, is also contained in the controller 14.

- 20    In Figure 2, the error messages of individual monitoring units (such as, for example, the paper flow controller PT) transmitted to the coordination module CM after the occurrence of an error are shown in their temporal sequence. A paper flow error such as, for example, a paper jam occurs in the printer 12 at the point in time t1. An image recording error subsequently occurs at the point in time t2, since the individual page causing the paper jam did not arrive at the printing group
- 25    30    at a predetermined point in time.

The image recording unit PU detects the recording error and transmits an error message to the communication [sic] module CM at the point in time t3. The paper flow controller PT first detects the paper flow error when the individual page does not reach a light barrier after the printing group at a predetermined point in time.

- 5 This is detected by the paper flow controller PT at the point in time t4, after the individual page has not reached the light barrier in time. A corresponding error message is transmitted from the paper flow controller PT to the communication [sic] module CM. The coordination module CM evaluates the error and determines at least one error type.

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- The communication [sic] module CM thereby preferably determines the causative error and executes further steps dependent on the error type. In the exemplary embodiment according to Figure 2, the printing process is interrupted and the printer 12 is halted. Undamaged, correctly printed pages present in the printer 12 15 that had already passed the error location at the point in time of the occurrence of the error are still output before the shutdown of the printer 12.

- At the point in time t5, all undamaged individual pages still present in the printer 12 are output and the printing event is interrupted. At this point in time t5, all error 20 states determined by the monitoring units (PU, PT) of the printer 12 in connection with the error are transmitted to the coordination module CM and stored. The time span between the Occurrence [sic] of the first error at the point in time t1 until the shutdown of the printer 12 at the point in time t5 is specified with T in Figure 2. The error states transmitted in the time span T are evaluated by the communication 25 [sic] module CM, whereby they are stored and compared with predetermined error patterns. A causative error is thereby preferably determined. The error patterns contain one or more error states, whereby given a plurality of error states the sequence of their occurrence and/or the sequence of their notification to the controller 14 is also taken into account.

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In the present exemplary embodiment, a recording error is registered at the communication [sic] module CM at the point in time t3 and a paper flow error is registered at the communication [sic] module CM at the point in time t4. This error pattern indicates that the first registered recording error is a consequent error  
5 of the subsequently registered paper flow error. The communication [sic] module CM thus determines the paper flow error using a stored error pattern as a causative error and registers this to the controller 14. The controller 14 thereupon initiates the error correction, in that it starts a routine to remove paper residues from the paper path and subsequently implements a self-test.

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If the self-test is successful, the printer 12 is automatically restarted. If the routing for the removal of paper from the paper path is not executed properly or if the self-test is unsuccessful, the controller 14 given an error message to the superordinate host computer 16. The host computer 16 thereupon stops the print jobs for the  
15 printer 12. An intervention of an operating personnel for resumption of the operation of the printer 12 and for continuation of an interrupted print job with the first page of the original print job not printed error-free by the host computer system 16 are only necessary in this case. Given the automatic resumption of the operation after an automatic correction of the paper flow error by the printer 12, no  
20 error message occurs on the host system 16. Only an entry of the original error, meaning the paper flow error, occurs in the error protocol of the printer 12, as well as a display of an error message on a display unit of the printer 12 via which the operating personnel is informed about the occurred error.

25 The automatic correction of the paper flow error can, for example, occur via the output of a damaged singe page that has caused the paper flow error. Other error causes can be automatically corrected again after the shutdown of the printer 12 or already corrected given shutdown of the printer 12. For example, an error in toner shortage in the developer station as a consequence of a high toner consumption is  
30 automatically remedied after the back-transport of toner, at the latest after a short shutdown time of the printer 12. Errors in the voltage supply of assemblies, in

particular via voltage fluctuations in the supply voltage or an interruption of the voltage supply of individual assemblies via overload release can, after a short wait time without operator action, at least be corrected such that a further operation of the printer 12 is possible.

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In another exemplary embodiment, given evaluation of the error states an error group is selected, whereby further steps can be established dependent on the selected error group, the determined error type and/or the causative error. Thus, for example dependent on the error group, as in the patent document US 6,185,379

- 10 B1 of the applicant, dependent on the determined error class, support can be given to remedy the occurred error, for example via display of corresponding text messages or video sequences on the display unit of the printer 12. The access to special information given error states can thereby occur via an access authorization procedure.

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In other exemplary embodiments, the type and/or the sequence of the occurred error states is considered upon comparison of the stored error states with the predetermined error patterns. The causative errors can thereby be determined very precisely and targeted measures for error correction can be implemented quickly.

- 20 In other embodiments of the invention, after an error state the print jobs can be continued at the point at which the error occurred, whereby the current print job to be executed is continued without interruption and without overlap. The print job is thus continued with the page that, in the print job, follows the last page printed without error before the occurrence of the error.

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The printer 12 is preferably a high-capacity printer with a printing speed of greater than or equal to 50 page [sic] A4 per minute. Due the relatively complicated design of such a high-capacity printer 12, an inventive error handling is particularly advantageous and appropriate.

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Although a preferred exemplary embodiment is shown and specified in detail in the drawings and in the preceding specification, this should be viewed as purely exemplary and not as limiting the invention. It is to be noted that only the preferred exemplary embodiment is shown and specified, and all changes and

5 modifications that presently and in the future lie within the protective scope of the invention should be protected.

Reference list

10	system for error handling
12	printer
5 14	controller
16	host computer
18	LAN
CM	coordination module
PT	paper flow controller
10 PU	image recording
t1 through t5	points in time of events
T	time from the occurrence of the error until the shutdown of the printer